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Alternative Aboriginal Economies

Martu Livelihoods in the 21st Century

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INTRODUCTION

In the western deserts of Australia, hunting and gathering endures as an important social and economic activity. That foraging persists within the boundaries of developed industrialized nation states may come as a surprise to those who evaluate foraging as less profitable than agricultural, wage or market alternatives (or to those who see it as a somehow inferior economic mode, e.g., Morgan 1877). However, the tendency to dismiss foraging as a less viable mode of production may be an error given the evidence that foraging can sometimes be the best option within constraints (e.g., Tucker et al 2010, Kramer and Greaves, chapter 2, this volume). If this is the case in Australia, then the maintenance of foraging into the twenty-first century may be as much an economic decision as one aimed at maintaining social relations, identity and connections to traditional lands and practices.

To determine if foraging is indeed a viable economic alternative to those embedded within state and market economies requires comparable data across each mode of production. To date, these data have been lacking. This is because quantitative ethnographic research into Aboriginal economies has tended to focus either on the internal dynamics of foraging practices (e.g., Bliege Bird and Bird 2008, Gould 1980, O'Connell and Hawkes 1984) or the external impacts of market economies and government

schemes (Alman and Gray 2000, Fijn et al. 2012, Martin 2001). Recently, an approach that seeks to understand the interactions between traditional and external factors came out of the Centre for Aboriginal Economic Policy Research at the Australian National University where Altman (2001, 2003, 2007, 2010) proposes a *Hybrid Economy* model. In this model, traditional, state and market options are viewed as complementary. Traditional practices feed markets (e.g., art, tourism), the state supports these activities through subsidies (e.g., welfare, pension, state-run jobs), with market expenditures (e.g., taxes) and some traditional practices (e.g., land management) providing support to the state.

Within this three-mode economic framework, individuals face trade-offs between engaging in one economic arena versus another. To evaluate these trade-offs, we examine the relative benefits of alternative economic pursuits in remote Western Desert Aboriginal communities today. Specifically, we evaluate the relative costs and benefits of foraging, working for a wage and producing paintings for sale. First, we establish estimates of the relative efficiency for each task. Then we examine how individuals allocate their time to each of these activities. Finally, we evaluate how time allocation to these activities varies as a function of the decisions of co-residing spouses and the number of co-residing dependents. These final analyses allow us to determine if individuals coordinate tasks with the household as an economic unit and evaluate which activities people focus on in order to provision dependents. If foraging provides a complementary income to other activities, then the contemporary division of labor between men and women may be a function of coordinated work choice. Further, if foraging activities are more compatible with childcare than the alternatives, this may provide an additional explanation for the retention of foraging. These results provide insights into how individuals negotiate between these alternative economies to fulfill subsistence needs while meeting social obligations to others in the community. These findings outline how individual decisions aggregate to create the contemporary shape and structure of Aboriginal economies observed in remote communities today.

ETHNOGRAPHIC BACKGROUND

Martu (also Mardu or Mardujarra) is the term most frequently used to refer to a group of Aboriginal Australians belonging to one of five dialect groups: *Manyjilyjarra, Kartujarra, Warnman, Putijarra and Kiyajarra.* Collectively, the dialects are known as *Martu Wankga* or 'Martu speak'. While individuals maintain their identity as belonging to one or some combination of these and other dialects, there is a still larger Martu identity, which

Figure 9.1

A Martu grandson and grandfather warming by a morning fire at an extended foraging camp outside of Parnngurr community, 2010 (by B.F. Codding).

seems to have emerged as members of these five dialect groups came into increasing contact with each other after the European incursion into the deserts. During this process, the hybrid economy also developed through the interactions of Martu with outsiders and their alternative economies.

Invasion, Abandonment and Return: the emergence of a Martu identity and a hybrid economy

Contact with European Australians occurred in multiple events with different groups from the early decades of the 20th century through the 1960s (Davenport et al 2005). Reporting on the Aboriginal economy during the contact period, Tonkinson (1993) suggests that individuals spent about half the day foraging, leaving ample time for other activities. Women's labor provided the majority of daily foods, which is sometimes focused on tree and grass seeds, other times on small vertebrates like sand monitor lizards; men focused on less reliable resources including hill kangaroo, which frequently resulted in failed hunts (Tonkinson 1993). Contact-era bands were centered on women's cooperative groups often focused on sororal

co-wives (Scelza and Bliege Bird 2008). Assuring reliable access to plants, especially seeds, required fire to increase plant diversity habitat heterogeneity (Walsh 1990, Bliege Bird et al, chapter 10, this volume). These broad patterns appear common in the Western Desert: Richard Gould (Gould 1968a, 1969a, 1969b) reports similar finds among *Ngatajarra* foragers to the south of Martu country.

At the time of contact, Aboriginal economies were based solely on foraging. But, this traditional economy and way of life shifted as people began to leave the desert and were taken to mission settlements ringing the desert. Some Martu and their relatives went north to the Catholic La Grange Mission (Bidydanga Community) while others went into Papuna, but the majority of those (and their descendants) now in Martu communities left their home in the desert and went to the station at Jigalong. Jigalong was originally established as a depot to supply crews constructing the Rabbit Proof Fence. Later, it also became the site of an Epistolic Mission (Tonkinson 1974). The mission's purpose was to convert the Aboriginal population now exiting the desert, and it attempted to do so through schooling the youth, encouraging a disciplined life among adults and providing rations to all. Referred to as a "capture by flour" strategy, missionaries and government operators introduced market goods as a means to make individuals abandon foraging economies and become reliant on purchased goods. This brought the first elements of a hybrid economy which coincided with a growing recognition that individuals from each dialect group shared a common Martu identity (Tonkinson 1974). This period ended with the missionary's withdrawal in 1969. In many ways, missionary efforts were a failure as they converted only one individual over the 25 years of operation (Tonkinson 1974, 2007).[1] The unintended consequences of the mission period included the realization that Martu had a collective interest in opposing outsiders and the economic alternatives forced upon them. It was in this context that Martu began their return to the desert. The period of "self-determination" or "autonomy" began with the return of Martu to the desert where they established three communities within their ancestral lands: Punmu, Kunuwaritiji (Well 33 along the Canning Stock Route) and Parnngurr. This work focuses on Parnngurr community which was established gradually as residents of Jigalong began camping near Parnngurr Rockhole to protest a mining operation testing for uranium in the area. While initial occupation wasn't permanent, Martu occupation sent a serious message to government and mining officials and resulted in the eventual establishment of Parnngurr community in the mid-late 1980s. This was shortly followed by the founding of Parnngurr School (Parnngurr

Martukurnu Kuul) in 1988 (Tonkinson 1993, Davenport et al 2005, Walsh 1987, Walsh 2008). With government support, the hybrid economy further expanded. While individuals relied heavily on foraging (Walsh 2008), government funds supported community infrastructure.

Government support of this "outstation movement" provided subsidies and infrastructure including a community store, government office and generators. While this support facilitated community development, Martu did not yet have title over the land. Traditionally, individuals gain and maintain rights to tracts of land known as estates (Stanner 1965). Through birth, initiation, marriage and other means, men and women gain a collection of estates through their life (Tonkinson 1993). The combined Martu estates center on the Karlymilli River and extend to the Percival Lakes and Lake Disappointment. With growing commercial (particularly mining) interests in the area, Martu sought to articulate their traditional system of land tenure with the Australian legal system. Through persistent efforts lasting into the 21st century, Martu were awarded native title over most of their traditional estates in 2002-2003. While the Australian government now recognizes basic Aboriginal land rights, problems of self-governance, political autonomy and economic independence are far from over.

Martu are still struggling with issues of land at least on two fronts. First, there is continued conflict with mining companies that seek to extract resources (including, once again, uranium) within the Native Title Determination Area. Current disagreements between mining companies and various members of the communities will likely continue as the potential benefits and costs of mining are debated. The second issue of sovereignty concerns the governance of Karlamilyi National Park which is situated within the center of the Martu Native Title. While the Karlamilyi River is one of the important core areas to Martu and especially to Warnman speaking people, the Australian government did not return these lands to Martu as part of the Native Title. Currently, government land managers are interested in incorporating Martu into future management schemes, and a few Martu are participating in a non-governmental organization (NGO) sponsored ranger program that pays individuals to monitor parts of the region frequented by tourists. However, most Martu simply assert their sovereignty over the park by traveling in and out of its borders without notice, burning, hunting and camping along the way.

Despite these issues of formal sovereignty and autonomy, individuals in these communities maintain their traditional rights to *Country* by continuing their traditional foraging economies. But today, these practices cannot be maintained without subsidies from the state. While state funds continue

to support the community, many government officials still lack insight into what is actually happening on the ground in these remote communities. Frequently this leads to misinterpretations of needs, wants and values (Folds 2001, Tonkinson and Tonkinson 2010). Perhaps as a result of these misunderstandings, policies can sometimes tend to be paternalistic and even outright hostile toward Aboriginal ways of life (e.g., 'the intervention'; Altman and Hinkson 2007, Maddison 2008). Some suggest that events such as this may mark the beginning of the end for the *self-determination* era, though this is far from evident in the remote communities in Western Australia. Here, ill-planned and mishandled government schemes more generally result in wasted funds and humorous stories of cross-cultural misunderstanding. Some relief from these repeated failures may come out of the recent rise of locally managed NGOs, though these are still quite new and only time will tell what their impacts truly are. As it now stands, basic government support of the community is integral to the maintenance of traditional foraging economies, a hallmark of the hybrid economy in remote communities today.

Community Life in Parnngurr Today

On any given day, Parnngurr community has between two and two hundred plus residents. Populations shift between communities, towns and ephemeral camps in the desert. Much of these movements are based on the same factors that would have pushed and pulled populations throughout the desert for thousands of years: food, water, family, social and ritual obligations. Though now with motor vehicles, individuals can travel large distances over short periods of time. For example, individuals may reside in one of the communities but still maintain daily access to their traditional hunting grounds over an hour's drive away. Food may dictate some movements at larger scales as well: many young families with bi-local ties between the desert and coast may temporarily relocate from one to the other based on which resources are 'on'. People are also likely to make such moves in order to maintain social ties between dispersed family and friends and to fulfill ritual obligations associated with initiations and funerals.

When in Parnngurr, *hearth-groups* consisting of collections of individuals generally live in *camps*, which are centered at house structures (mostly pre-fabricated) supplied by the government or donated by one of the local mining companies. Each generally has a kitchen, two to four bedrooms, a bathroom and possibly a main living-type room. Anyone can rent a camp from the community, though the majority of camps are maintained by senior community members. Camps generally have a core set of residences,

though many people shift between multiple camps when they come and go from the community. People generally sleep inside in the cold months, outside in the warm months. When outside, people generally cluster under bough sheds, sharing a single open space. When inside, rooms are generally shared based along kin and age classification (e.g., single-men's room, co-habiting spouses perhaps with children, older co-wives or sisters, single parents with children, grandparents with grandchildren, etc.). Rarely, is anyone left with a room to themselves, both out of tradition and personal preference. However, this does not mean that those who share space necessarily have any extension of that relationship into the daily economic or social sphere. Rather, it signifies merely that they co-reside (more below).

ALTERNATIVE ECONOMIES: FORAGING, PAINTING AND WAGE LABOR

Martu living in the remote community of Parnngurr have several work alternatives which vary in the benefits they provide. Here we discuss three main alternatives: foraging, painting and wage labor.

Foraging

Foraging is a major occupation of remote community residents today. Someone goes out foraging from the community nearly every day and respectively, women and men spend about 13.3% and 17.4% of all days foraging (Codding 2012). It remains as important for food as it is for maintaining social relations, individual identity and ties to traditional life. While many aspects of foraging have changed over the last 40 years, most of these changes are predictable from a simple cost/benefit perspective. Seeds have dropped from the diet, being replaced by processed flour (O'Connell and Hawkes 1984). Metal tools have mostly replaced those made of wood and/or stone. Rifles have largely replaced spear-throwers. Perhaps most important, vehicles have become central to aspects of travel, transport and for some resources, search.

While Martu will still sometimes walk out from the community to forage for nearby resources, vehicles allow Martu to keep a relatively centralized residential base in the community while maintaining access to traditional foraging locations (or *hunt regions*) distributed up to about an hour away. Perhaps as an unintended consequence of adopting vehicles, hunting tracks have become central corridors of movement through the desert. The main tracks head out of the community in four named cardinal directions and branch out from there in what initially seems like an innumerable combination of connections and loops. Detailed knowledge of these

four-wheel drive hunting tracks is not only a skill required for navigation, but also a source of pride for those who raise and lower a hand, tick a finger and point with their lips indicating prior knowledge of every bump, twist, turn and landmark along the way. Equally important is the creation of new, straight tracks into long unvisited foraging locales and the correction of old, unnecessarily curving roads. Depending on the foraging activity and the season, Martu may travel out from the community and begin searching for resources immediately (e.g., bustards, camels, etc.) subsequently returning to the community to process and cook their catch. But for most resources, Martu head out of the community and establish a temporary *dinner-time camp* (Bird Bliege et al. 2009, Bird et al 2013, Bliege Bird and Bird 2008, Bliege Bird et al 2009, Codding 2012, Codding et al. 2010).

Dinner-time camps are the economic and social locus of foraging. Once foragers decide on the hunt region that they are going to travel to, the location of the dinner-time camp is chosen on arrival. Generally this happens through unassuming consent, though arguments over the ideal locale do sometimes occur. The average dinner-time camp composition includes 2.3 ± 1.1 men, 3.6 ± 0.8 women and 2.1 ± 1.4 children (Bliege Bird et al. 2012b). Upon arrival, foragers may immediately depart from the vehicle to start foraging, others may collect fire wood (*waru*) while some may wait around for a bit before departing. Depending on the activity, foragers may work together or separately and may be accompanied by children or may leave their dependents behind at the temporary dinner-time camp. The duration of their foraging venture is here referred to as a *foraging bout*. A foraging bout includes the time a forager is in the process of searching for, pursuing and traveling back to the dinner-time camp.

When people return from hunting and collecting wild resources, they typically sit around the fire processing their harvest over discussions of the bout, and perhaps a cup of tea. With smaller resources like sand monitor lizards, foragers typically process their own catch and sometimes the catch of others; for larger resources like kangaroo, the hunter will deposit their prey at the edge of camp and take a seat with the others; a senior individual will typically take-over processing from there (Bird and Bliege Bird 2010, Bird Bliege et al. 2009, Bliege Bird and Bird 2008, also Gould1968a). Animal resources are cooked following the *Law* passed down by the *Dreaming* ancestors, (the *Jukurrpa*): hair or skin is first singed in the hot flames of a burning fire, then a portion of the fire is allowed to burn down to coals, heating the sand in the process. A hole is dug to a size accommodating the animal which is then carefully placed and covered with hot sand and coals. Sometimes a senior woman may bring a bowl, flour and baking powder

in order to make a unleavened bread called a damper (similar to traditional seed dampers), which is also cooked in the fire either in a depression in the sand (following the method used to cook game resources) or in a cast-iron pan. After processing and cooking is completed, resources are generally shared between all present. Sharing around a hearth takes on a ritual appearance as individuals pass lizards, cuts of meat, fruit, torn-off bits of damper and store bought items like crackers or a can of baked beans. Based on the high probability of failing to capture some particular prey items (Bird et al. 2009, Bliege Bird et al. 2009, Bliege Bird and Bird 2008, Codding et al. 2011), particular activities typically result in individuals relying on the foraging income of others (Bird and Bliege Bird 2010, Bliege Bird et al. 2012b). However, Martu gladly share with those who do not contribute. When everyone is satiated (or earlier if late in the day), everyone loads up in the vehicle and begins the return trip to the community. Departure from dinner-time camp is sometimes discussed, but is frequently abrupt, based on some comment or a consensus of full stomachs. Occasionally if the foraging is very productive and the obligations elsewhere limited, a dinner-time camp may extend into an overnight camp. Though more frequently, overnight or multi-day camps are planned in advance. While these longer duration camps extend the size and scope of dinner-time camps, they typically maintain the same basic characteristics.

Painting

While Martu art originated long ago in a non-commercial context, it has transitioned over the years from traditional mediums including the body, cave walls and sand to acrylic on canvas aimed at a national and international art market. While this process began gradually, the production of art-for-sale expanded rapidly with the formation of the Martu arts cooperative (*Martumilli*) in 2006. Since then, painting, and to a lesser extent, basket making and carving have become a major economic and social force in the community.[2] Martu art finds itself uniquely situated within the Desert Art tradition. Particular individuals are becoming celebrated artists by a growing community of critics, scholars and buyers.

Painting is seen as a way of maintaining and sharing traditional knowledge while simultaneously producing a product for market. Paintings are most frequently expressions of particular *Dreaming* tracts (or 'song lines') of estates (or *Country*) over which individuals have traditional rights. Though to the artist, the paintings are more than mere representations. According to Myers (2002), desert art is not so much a story that can be decoded, nor a representation of some discrete event or place; rather (to those initiated)

it *is* what it represents. Carty (in Davenport et al. 2010) has made a similar case, arguing that Martu artistic expression is more than representation: when discussing a collaborative painting of four important water sources from *Kunawarritji to Wajaparni*, Martu artist Jeffery James remarked that "this is our family tree — this painting." Here, place is family is *Jukurrpa*; the social landscape, the physical landscape and the metaphysical landscape are one and the same, as are their representations in paint. While these could be judged excessively artful interpretations, there is a strong basis for accepting this alternative ontology. In remarks on Aboriginal philosophy, Elkin (1969) notes that there is not a direct cause-and-effect relationship between the *Jukurrpa* and things in the world because the two exist simultaneously as the same. Similarly, this may be extended to painting—acrylic on canvas is not any less the *Jukurrpa* than Country is *Jukurrpa*. This is at the core of why artistic production and sharing is so important. The Law passed down from the dreaming ancestors requires the maintenance of these traditional practices, and encourages them to be shared widely. Akin to performative representations in traditional dance and song in which knowledge of Country is shared to others, producing paintings that are distributed widely across the world serves a similar function, though in a different medium, to a different audience (one that may never be able to visit or learn more of that country) and at a much larger scale (Carty 2012, Myers 2002). From a source of income to an extension of the dreaming, there are multiple meanings behind Desert Aboriginal Art, each of which has implications for the future of remote communities and Aboriginal identity (Carty 2012, Dussart 2006, Myers 2002).

While it is difficult to overemphasize the social and ritual importance of painting, economics are also central to individual decisions to paint and/or produce baskets. The time required to produce a painting depends greatly on the size of the canvas. Likewise, the price depends both on the size of the painting and the renown of the artist. Celebrated artists may routinely fetch about $10,000 AUD for a medium-sized painting and extraordinary collaborative paintings sell for upwards of $100,000 AUD. But these exceptional works are rare. Based on observations, conversations with artists and interviews with members of the art community, the average painting takes about two to four weeks to produce (painting nearly every day) and can be sold for $1,000 to $5,000 AUD. Smaller paintings may take only a week to produce and sell for about $1000 to $250 AUD. Paintings sold through the cooperative return about 70% of the profit to artists. This suggests that talented artists may be able to bring in about $500 AUD per week if they opted to engage in painting full time. While likely accurate, these figures

should only be considered rough estimates.

Baskets, like painting, are a new medium for Martu. They are generally produced by collecting grasses that are then bundled, wound and woven together with colorful yarn. A basket generally requires less time to produce than a painting (though individuals do spend a good deal of time searching for and collecting appropriate grasses) and generally sell for less than paintings. Baskets take about one week to produce and can be sold for about $500 AUD on average. One traditional medium, wood, is also used to carve secular objects that sell also for about $500 AUD (e.g., nulla-nullas, boomerangs, etc.); though very few people are doing this currently in Parnngurr.

While people could paint or make baskets nearly every day (as long as the materials are available), painting generally occurs incrementally. People sometimes spend many consecutive days sitting in front their camp, in the art shed, or at the arts cooperative office in town, but other times, individuals start a painting, work on it for half the day, then go out hunting in the afternoon, leaving the painting partially finished for weeks. Such a staccato rhythm may have to do with other social obligations, but may also have to do with how individuals weigh alternative economic pursuits. Indeed, the economics of painting and how it ties in with alternative livelihoods is an open topic that demands further exploration.

Wage Labor

Opportunities to engage in wage labor are limited in remote Aboriginal communities. The most common form of employment comes from the state through the Community Development and Education Program (CDEP). While every unemployed member of the community receives either a welfare stipend through Centerlink (or a 'pension' if they are of retirement age), those who chose to work for CDEP can double their welfare payments from about $500 to $1000 AUD per fortnight. All CDEP jobs are generally off-and-on based on the presence or absence of someone in charge to organize them. Tasks include cleaning the community, dumping rubbish bins from individual camps at the tip (dump), assisting in the operation of the government office and cooking meals at the center for the elderly.

Martu may also receive wages from non-profit organizations funded by the government through grants. Tasks include cultural awareness training for miners, monitoring of endangered species, and ranger work along the heavily toured Canning Stock Route. These pay well, about $100 AUD per day, but opportunities are inconsistent. As such, working for a non-profit probably provides about the same weekly rate as topping off unemployment

benefits with CDEP wages, providing about $1000 AUD per fortnight. One exception is a ranger program that was started by the non-profit organization *Kanyrninpa Jukurrpa* in 2009. If funding continues, it may provide a few people with regular work directed at preserving natural and cultural resources in the Martu Native Title and Karlamilyi National Park. But, as with most government sponsored employment schemes, programs can be cut, funding lost and wages can disappear. In reality, the irregularity of employment is not necessarily a bad thing as Martu place a greater value on so many other aspects of life than earning regular wages. When employment comes into conflict with social, ritual and family obligations, wage work rarely takes precedent.

While the data examined below covers only wage labor in the community, there are wage opportunities outside of the community and these can draw people away for extended periods of time. Options include work in cattle stations (particularly to the north near Bidydanga), but more frequently people take up work in one of the regional mining operations. Martu who work in the mines earn about $3000 AUD per fortnight, with one or two weeks off in between shifts. Such rigid schedules frequently conflict with important obligations, including initiations and funerals. Moreover, time away from family is a serious added cost. Frequently, individuals will take a job for a brief rotation in order to acquire enough funds for a particular item or event. Often though the early departure may not have been planned, but emerged out of conflicts between job requirements and familial obligations and/or longing for home. As Burbank (2006) has written about Aboriginal communities in southern Arnhem Land, sometimes paid work is avoided *because* of the obligation to be on a schedule.

METHODS

Understanding why foraging may continue within remote Aboriginal communities requires comparable data across each work alternative. To this end, we collected data on community demographics, caloric returns associated with different activities, time allocation and evaluations of those choices based on other co-varying factors (spouses work decisions and the number of co-residing dependents).

Weekly census data were collected between the third week of April and the first week of June in 2010 to capture a bit of the variability in the distributions of populations. Since individuals move between and within communities, this census period should provide a measure of mobility and shifting residence patterns that determine community populations. These data were collected the same day of the week and always in the morning.

Accuracy was checked by multiple independent counts and through conversations with community members. While accurate over the observation period, these figures do not necessarily capture all of demographic variability expected even over a typical year as the community population may swell for particular events (e.g., funerals, initiations) and drop when such events draw people elsewhere.

To understand how people spend their time in the community, the activities of 50 individuals were recorded per day for two months covering April, May and June of 2010. For each observation period, the sample includes individuals occupying at least four spatially discrete camps of varying demographic compositions in order to limit geographic covariance. Camps were selected to provide a broad sample of individuals from each age/sex category. Each day, we recorded whether individuals allocated time to foraging, wage labor or painting. While coarse-grained, this per-day scale should be accurate as each activity either requires more than half of a day or individuals tend to allocate more than half of their day to one of these activities. As such, each activity is essentially mutually exclusive per day. The sampling procedure was designed to capture patterning in community life, if individuals left the community, they were recorded as absent and ignored for the rest of the sample week or until they returned (unless if when they returned, they took up residence at a different camp that was outside the sample). If all the members of a camp left through the course of a week, each individual was recorded as absent until the next week when another camp was selected.

Fine-grained data on individual foraging decisions and returns are discussed in greater detail elsewhere (Bird et al. 2005, 2009, 2013, Bliege Bird and Bird 2008, Bliege Bird et al. 2008, 2009, 2012a, 2012b, 2013, Codding 2012, Codding et al. 2010, 2011, 2014). Data collection includes focal individual follows with hunters and continuous camp scans of all individuals leaving and returning to the dinner time camp (Altmann1974). Weights of acquired foods were measured or estimated from counts. Weights were converted to kilocalories following standard nutritional data (e.g., Brand Miller et al 1993).

To make foraging, wage labor and painting comparable, costs and benefits for each activity were translated into two variables: time and calories. While these are direct measures of foraging effort and productivity, money acquired from the production and sale of art and from wage labor was converted to calories based on the cost per calories at the community shop. Individuals generally make routine, even daily visits to the community shop; the alternative would be to make a trip to the town of Newman to purchase food at a major grocery store (Woolworths). However, individuals

are frequently limited by access to a vehicle capable of making the long trip and the funds to purchase the large amount of fuel required. As such, the community shop is the most reliable place to secure purchased foods. While fresh fruits, vegetables, cheese and eggs are typically available shortly after the arrival of the resupply truck, they run out of stock quite quickly. As such, these were excluded from this inventory. To convert cash into calories, the total nutritional value of each shop item was divided by its unit cost; thereby providing a measure of kilocalories per dollar. Shopping patterns from Scelza (2012) were used to calculate a weighted mean and median to represent the amount of energy (kcals) individuals acquire with each dollar spent.

Because these are largely count data assumed to take a Poisson distribution, statistical inference is made through the use of generalized linear models with a Poisson error structure. These were run in R (R Development Core Team 2013). Model results include the likelihood r-square value (R^2_L) and the alpha or p value. For more information, see Crawley (2007), Faraway (2006), Grafen and Hails (2002), and Menard (2002).

RESULTS

Community Demographics

One hundred and thirty eight different individuals were recorded over the seven week census period, though there were never that many people in the community all at one time. At any given time, the number of people in the community ranged from 41 to 85 (see fig. 9.2a, table 9.1). The increase over the observation window is not linear as such fluctuations are truly typical and caused by multiple factors. While community population can easily spike into the hundreds, usually during 'Footy' (Australian Rules Football) competitions, initiations or funerals—none of which occurred during this window of time.

A total of 20 camps were occupied off-and-on during the census period. Only four camps were occupied during all seven weeks and the majority of camps were occupied only two of the seven weeks. Some individuals never settled at any camps, instead they floated between camps or resided in common areas.

On average, camps included between four and five individuals, though camps with two people were recorded most frequently (see fig. 9.2b). Married individuals had their spouse present about 40% of the time. The average camp had between one and two dependents at any given time ranging from zero to five (see fig. 9.2c). Summing across all camps, there was an average of 0.5 dependents for each non-dependent adult.

Table 9.1

Summary of census data by age class and gender.

Week	Young	Adult	Senior	Women	Men	Total
1	15	19	7	16	25	41
2	18	27	10	22	33	55
3	16	24	12	24	28	52
4	14	25	18	24	33	57
5	13	27	6	22	24	46
6	30	38	17	39	46	85
7	22	34	20	33	43	76

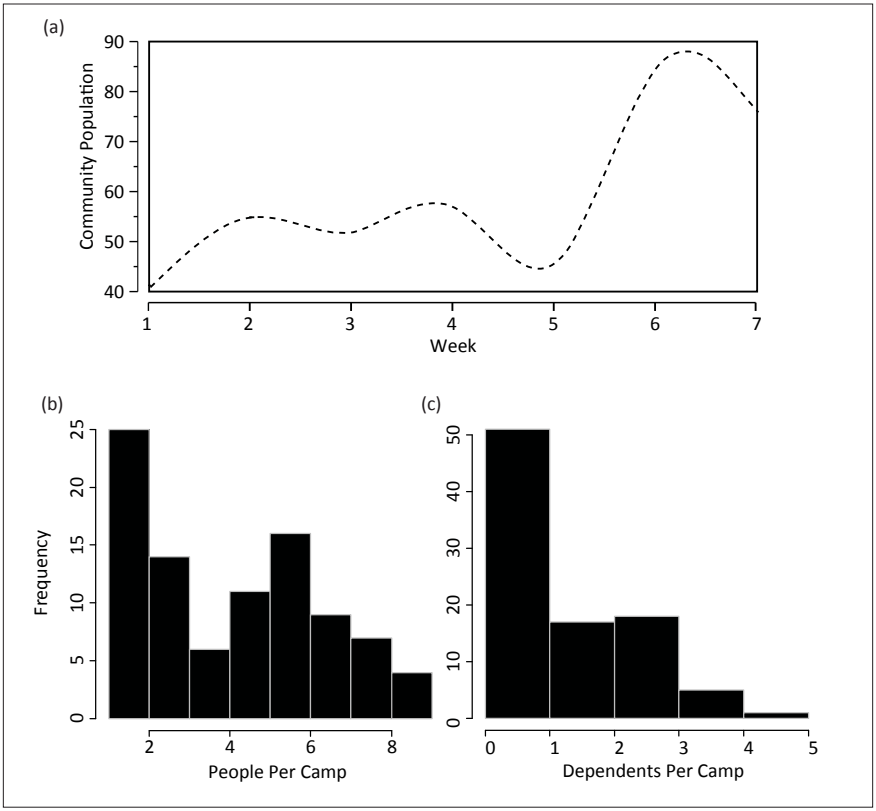

Figure 9.2

Summary of demographic data including (a) total community population across the census period by observation date with between observation values interpolated with a smoothing spline (λ=1; data in table 9.1), (b) distribution of the number of people in each camp and (c) the number of dependents per camp per week.

Benefits of work

Martu typically return from foraging well fed. While foraging returns vary substantially depending on the resource and season, returns average 2506.3 kcals per foraging bout across 1876 bouts including all foraging activities recorded from 2000–2010. If only successful hunts are included, this number increases to 3632.5 kcals per bout averaged over 1224 successful bouts. With the average foraging bout lasting 2.41 hours, the mean overall return rate (including both successful and failed bouts) is 1200.31 kcals per hour. Hypothetically, if foragers were to extend a bout to an eight hour period, they could expect returns upwards of 9,600 kcals per day.

To make foraging, painting and wage labor comparable, dollars are converted into calories though the cost of items in the community store and their caloric value. Store items range from a low of about 50 kcals per dollar for frozen chicken breasts or canned vegetables to a high of about 1456 kcals per dollar for flour (table 9.2). That flour has the highest return rate per dollar is particularly interesting given that flour has largely replaced wild seeds as the prime grain source; a common trend in Aboriginal societies (O'Connell and Hawkes 1981). Most Martu camps have a bucket of flour around and people frequently make flour damper (a bread made with only water and baking powder) in place of what would have traditionally been seed damper (collected and ground wild seed and water). While bleached flour is surely less nutritious than wild seeds, it is still healthier than many of the other high calorie items like oil and sausages. Frequently purchased items, like meat pies actually have a relatively low return per dollar, most likely due to their added value of being a processed meal ready to eat after warmed (frequently in their tin, on the fire).

To calculate the amount of energy an individual can expect to acquire for each dollar spent at the shop, we calculated a weighted mean and median based on spending patterns at the shop. Scelza (2012) reports that shop expenditures are distributed non-randomly across food categories. On average, 47% of dollars spent go to general grocery items (flour, canned food, dried goods, snacks, etc.), 19% to cool drinks (e.g., cola, sports drinks), 13% to meat, 13% to tobacco, 4% to fruit and vegetables and 4% to water. Using these values to weight mean and median energy per dollar spent shows that a dollar at the shop can return 224 kcals on average and a median of 199 kcals. Given the skewed distribution of shop items, the weighted median value was used to estimate central tendency.

The base income received from welfare comes to about $36 AUD per day (table 9.3). Based on the weighted median value of shop items, a community member receiving welfare could acquire 7,107 kcals per day if they

Table 9.2
Cost (AUD) and energetic value (kcals) of items at the community shop.

Item	Kcals	Unit Cost ($)	Kcal/$
Diet Cola*	5	2	3
Tomato Sauce	102	5	20
Sports drink	200	5	40
Chicken Breasts	1100	23	48
Cola	100	2	50
Canned Vegetables*	210	4	52
Instant Noodles	296	5	59
Beans in tomato sauce	328	4	82
Meat Pies	684	8	86
Spaghetti Noodles	631	6.5	97
Chick Peas	604	5	121
Stew Chops	2150	17	126
Kangaroo Tail	1670	10	167
Hamburger	2444	12	204
Pearl Barley	1239	5	248
Rice	1755	5	351
Honey	1254	3	418
Sausages	4050	9	450
Dry Red Lentils*	3377	5	675
Canola Oil	6089	5	1218
Flour	7280	5	1456
Mean			284
Median			121
Weighted Mean			224
Weighted Median			199

* Denotes expired item at time of recording.

spent 100% of their income (table 9.3). More realistically, spending 25% of their income, those on welfare could bring in about 1,777 kcals per day with other funds going to rent, vehicle maintenance, fuel and other living expenses. Assuming that the average person requires about 2,000 kcals per day and given that across the community for the census period there

Table 9.3
Estimated wages earned in Australian Dollars (AUD) and estimated energetic returns (kcals) per day for each activity.

	Australian Dollars			Kilocalories		
	Month	**Week**	**Day**	**100%**	**50%**	**25%**
Welfare/Pension	1,000.0	250.0	35.7	7,107.1	3,553.6	1,776.8
Foraging*	-	-	-	9,602.5	4,801.2	2,400.6
Foraging+Welfare	-	-	-	16,709.6	8,354.8	4,177.4
Painting†	2,000.0	500.0	71.4	14,214.3	7,107.1	3,553.6
Painting+Welfare	3,000.0	750.0	107.1	21,321.4	10,660.7	5,330.4
Wage Labor‡	1,000.0	250.0	35.7	7,107.1	3,553.6	1,776.8
Wage Labor+Welfare	2,000.0	500.0	71.4	14,214.3	7,107.1	3,553.6
Mining	4,500.0		150.0	29,850.0	14,925.0	7,462.5

* Foraging assumes average returns per hour with 100% indicating an eight hour foraging bout. †Painting assumes an artist can produce a small painting in one week working exclusively on painting.‡ Wage labor calculation assumes an individual working eight hours per day for CDEP over five work days; amount per day is divided by seven days.

was an average of 0.5 dependents per non-dependent adults, this suggests that the average person should bring in about 3,000 kcals per day to cover themselves and their dependents (unless they purchased high return items such as flour and sausages exclusively). As the estimates show, this would be difficult on a welfare stipend alone. With the alternative options in the community, individuals could increase their income by choosing to work for the community, producing paintings for sale, or by foraging to supplement their cash income with bush foods.

Those who choose to work for the community can double their welfare income, bringing in about 3,553 kcals per day (table 9.3). However, as foraging results in an average of 2,892 kcals per day (see above), individuals would be better off taking their welfare or pension money to purchase items (such as flour) at the shop and supplementing these items with foraging, bringing in a total of about 4,177 kcals per day—more than enough to cover self and 0.5 dependent. Two other alternatives include basket making and painting. While basket making (and perhaps carving) provides an average at the same level as community wage labor, painting exclusively

would bring in returns in excess of 5000 kcals per day (table 9.3). However, this is a rather high estimate for painting and one that would only come regularly from securing a stable source of painting supplies and buyers. While mining is displayed for reference, it is not considered as a substitutable alternative as it requires people to be away from the community for extended periods of time.

Overall, these results suggest that individuals do need to supplement their welfare income and that they would be best off doing so through the production and sale of art. However, while anyone *can* paint, not everyone has the requisite skills to regularly and consistently produce high-quality paintings that will sell. As such, we expect that some skilled individuals will specialize in painting. For whom painting is not a realistic alternative, we predict that the majority of individuals should opt to forage rather than work a wage labor job in order to supplement their income.

Next, we test these predictions by examining how individual allocate their time between these different activities and how their decisions in activity choice vary as a function of the variability in camp and community demographics. Specifically, we examine how individuals alter their work decisions in coordination with a co-residing spouse, or as a function of the number of co-residing dependents.

Time Allocation

Between 17 and 37 persons were observed in one of these activities per day, summing to 899 person days for which an activity was recorded and 357 person days in which individuals were scored as absent, totaling 1,256 person days overall. Individuals were divided into three age classes: pre-initiate (young), adult and senior adult.

Adults spent about 39% of all days either foraging, painting or in wage labor while senior adults spent 57.8% of their days working in one of these activities (Codding 2012). All other days were spent in some other activity including ritual, vehicle repair, or resting.

Of the days allocated to one of these productive activities, adult and senior individuals combined divide their time unevenly, with approximately 52% of days dedicated to foraging, 39% to wage labor and 9% to painting or producing other traditional goods for sale. These results show that adult and senior individuals bias their time disproportionately to foraging, as we predicted based on the benefits of these alternatives. However, there is a good degree of variability. One woman and several men only spent time in wage labor, another group of individuals only in foraging and one woman was only observed painting. To understand what might drive this variability,

next we examine how the presence or absence of a co-residing spouse and the number of co-residing dependents predict time allocation across these different activities.

Determinants of Work Choice

To determine what explains variability in work choice decisions, we examine individual time allocation relative to household demographics. First, if foraging provides better outcomes to other activities, then coordinated work choice by men and women could help explain the maintenance of foraging and variability across individuals. Second, if foraging individuals choose to allocate more time to foraging when they reside with more dependents, then foraging may be a more compatible option than other work alternatives, which may provide additional rational to retain foraging practices.

If spouses specialized in complementary activities, then we expect the activities of co-residing spouses to negatively covary (Gurven and Hill 2009). However, an examination of paired spousal data suggests that individuals do not coordinate their labor at all, neither negatively or positively.[3] This shows that the time allocated to different work alternatives does not positively or negatively covary between co-residing spouses, suggesting that husbands and wives do not coordinate as economic units. As such, complementarity across work alternatives does not seem to predict variability in time allocated to work, and does not help explain the retention of foraging.

If individuals provision and care for co-residing dependents (regardless of relatedness), then they should increase work effort as a function of the number of co-residing dependents. While we should not necessarily predict a linear increase given the possible addition of care shared between children (Kramer 2011), work choice should still be partially directed by the needs of dependents. The results show that neither the number of individuals working for a wage (R^2_L=*0.02*, p=0.189) nor the number of people painting (R^2_L<*0.01*, p=0.434) changes as a function of the number of co-residing dependents. However, people do increase the amount of days they spend foraging with up to three co-residing dependents (fig. 9.2; R^2_L=*0.07*, p=0.0033), suggesting that individuals provision dependents through foraging rather than wage labor or painting.

DISCUSSION

While foraging is often dismissed as a viable economic alternative, our results show that foraging appears as one of the best economic alternatives available in remote desert Aboriginal communities today. However,

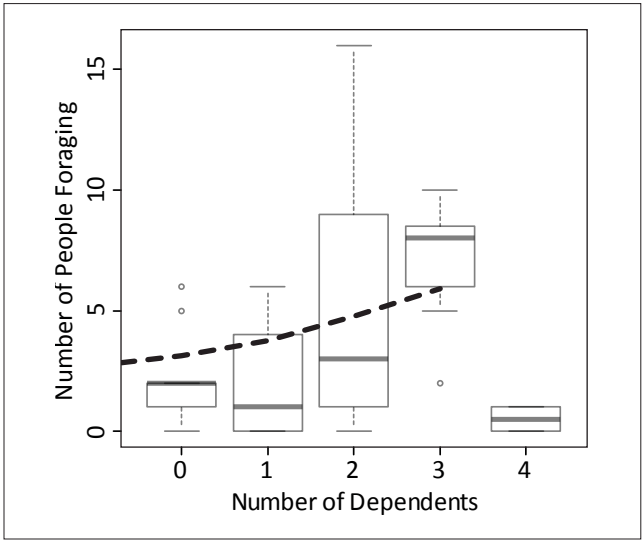

Figure 9.3

Number of individuals per camp per week foraging as a function of the number of co-residing dependents. Dashed line shows predicted trend from a Poisson generalized linear model. Box-plots show the distribution of counts.

because foraging today requires travel in four-wheel drive vehicles and because these require monetary inputs for fuel and maintenance, foraging is only viable with either some combined effort in wage producing tasks, or through the reliance on the state, as is the case with Inuit (Wenzel, chapter 3, this volume). Considering these factors, Altman's (2001, 2003, 2007, 2010) hybrid economy may aptly describe conditions in remote communities today. However, rather than suggesting that Aboriginal populations should work to articulate their traditional economies with the market (i.e., through painting) or state (i.e., through co-management of natural resources), these results suggest that individuals should be left to engage with their traditional economies in ways that best suit their needs.

Given the benefits accrued through foraging, it is not surprising that individuals in Parnngurr allocate more time to foraging than to any other economic pursuit. Variability across individuals seems to be partially determined by household demographics. While spouses don't seem to coordinate their work effort, individuals do choose to forage more to care for more dependents. This is likely the result of immediate returns gained from foraging and from the fact that foraging within a dinner-time camp provides a social environment more compatible for child care than the

alternatives, especially when extended family members, particularly grandmothers, may be available to share in the costs of childcare (Scelza 2009). With an average of about 2 children per dinner-time camp, the average adult foraging trip would provide children with care, food and education on traditional practices. While not all foraging activities are equal in their propensity to reliably provide food or in their compatibility with childcare, many of the foraging activities undertaken most by Martu do indeed meet these requirements. Women's sand monitor hunting, which also provides long-term environmental benefits (see below, Bliege Bird et al. chapter 10, this volume) may be particularly important.

On the Foraging Mode of Production

In his classic treatise, Sahlins (1972) proposed that hunter-gatherers were the *original affluent society*. This was based on, among other things, the observation that Aboriginal foragers in Arnhem Land (see MCarthy and MacArthur 1960) worked few hours to provide for their *limited wants and limited needs*. We raise this point not to prolong the stereotype, but to illustrate an alternative interpretation of this observation in light of the data presented above. The pull of foraging as an economic alternative may be driven by the benefits it affords individuals. It is not necessarily driven by limited wants, but by a basic economic evaluation of the costs and benefits of foraging relative to the alternatives. Even in the 21st century, foragers may be able to work fewer hours for parallel rewards. As such, it should be of little surprise that we see so many individuals foraging so frequently in the remote communities today.

These trends make particular sense when viewed through the lens of human behavioral ecology (Winterhalder and Smith 1981, Winterhalder and Smith 1992, Winterhalder and Smith 2000). This approach typically assumes that individual decisions are made in ways that optimize outcomes within constraints. By quantifying the trade-offs associated with different activities, we are able to gain better insight into the costs and benefits individuals experience. In the context of 21st century hunting and gathering, as in any economic context, it's not hard to see why working less for equal rewards may be a better strategy. Add a social context within which accumulation is not rewarded, but punished (Bird and Bliege Bird 2010, Myers 1986, Myers 1989), and the continued role of a foraging mode of production is understandable. Indeed, the social costs imposed on those who opt out of a traditional economy---where individuals gain wealth by sharing widely---may be equally important in explaining why individuals continue

to forage (Bliege Bird, chapter 10, Blurton Jones, chapter 6, Coxworth, chapter 8, Wenzel, chatper 2, this volume).

While foraging may be able to satiate limited wants and limited needs, some from 'mainstream' Australian society do not understand remote community life and consider foraging to somehow be 'backward'. Some individuals use this logic as support for cultural assimilation (McGregor 1999, Myers 1988). Such ideas linger in the background of contemporary debates of 'development' in the 21st century that center on economic integration (Altman 2010).

On Development and Conservation

These findings suggest some specific reasons to continue government support for these remote communities and the traditional activities that occur in and around them. As others have noted, indicators of health, wealth and well-being all show that those living in remote communities may be better off than their urban counterparts (Burgess et al 2005, Garnett et al 2009, Tonkinson and Tonkinson 2010). However, much of the efforts to 'help' Martu in these communities may simply impede what is causing these benefits.

Contemporary government policies frequently encourage remote community residents to engage in the market economy, which detracts from traditional strategies designed to make a living and care for children. As shown above, Martu may be much better off foraging than engaging in government employment schemes. Consequently, choosing to forage is a rational economic decision. Instead of trying to stop people from hunting and gathering wild resources, government policies may do better to support traditional practices. Rather than providing job training, in-town education and 'opportunities' to work, perhaps the most important thing to do, both for people and the environment, is to encourage and support life in these remote communities. Support of foraging may be particularly important as foraging from a central community incurs greater monetary costs (see also Wenzel, chapter 3, this volume). This is most likely due to a (relatively) large population that is likely to deplete resources around the community leading to higher travel and transport costs to and from productive foraging locations (e.g., Codding et al. 2014). Funding diesel for vehicles that allows individuals to travel to more remote locales may be crucial to increasing food-sovereignty in these remote communities. Unfortunately, government and even private funding has begun to downplay and even disallow expenditures on purchasing vehicles, vehicle maintenance or diesel. The opposite

should be a priority if people want to ensure Martu livelihoods in these communities—doing so may also provide added benefits as foraging may promote the health of individuals and of the overall environment.

Because foraged foods are typically healthier than low-quality store items (particularly those that are affordable) and because foraging itself generally leads to greater levels of exercise than would be obtained from most jobs, individuals serve to gain on multiple fronts by maintaining a foraging lifestyle. This may further lead to reductions in the overall health care costs that are currently dominated by treatment rather than proactive measures. In addition, mental health benefits may also derive from supporting instead of stigmatizing this traditional mode of economic production. Because foraging is equally valued for social as well as economic reasons, stigmas on foraging can be particularly harmful—but breaking down these stigmas could be particularly beneficial.

Not only does foraging serve to benefit individual health, but it also promotes the health and biodiversity of the desert environment. As discussed elsewhere (Bliege Bird et al., chapter 10, this volume, Bliege Bird et al 2008, 2012a, 2013, Codding 2012, Codding et al. 2014), because desert ecologies co-evolved with Martu hunting, collecting and burning practices, biodiversity tends to increase coincident with Martu foraging. The restructuring of vegetation resulting from Martu burning practices may be particularly beneficial to many now threatened small mammal populations. This is something that government agencies express interest in promoting, but may fail to achieve. Attempts to incorporate Aboriginal insights and participation into government sponsored environmental management schemes typically attempt to turn individuals into Western style land managers—a trend sometimes referred to as a 'caring for country' movement. However, at least in the Martu case, it is just what Martu *do* that promotes biodiversity. Establishing formal programs to 'care' may simply get in the way of the real environmental benefits that result from Martu hunting, burning and gathering in an ecology that evolved with humans performing those very activities (Bliege Bird et al., chapter 10, this volume; Codding 2012, Walsh 2008). In essence, agencies don't need to pay people to not hunt so that they can work to 'manage' the land. Instead agencies should encourage hunting—biodiversity will follow (Bird 2009).

Policies that create disincentives to forage will likely have negative consequences---less food sovereignty, declines in physical, mental and social health, and reductions in biodiversity--- the opposite of what such policies intend to accomplish. Policies that support foraging, on the other hand,

will likely have positive effects on community health, social cohesion and the desert environment.

SUMMARY AND CONCLUSION

Models of 21st century foraging economies tend to either ignore external dynamics, instead focusing on foraging activities alone, or examine state and market alternatives without treating foraging as a viable alternative. By examining the trade-offs between foraging, painting and wage labor within a remote desert Aboriginal community, we show, contrary to many common assumptions, that foraging is one of the most productive economic alternatives within the community. While co-residing spouses do not seem to coordinate labor across activities, individuals do forage significantly more frequently as a function of the number of co-residing dependents. This suggests that while households are not economic units *per se*, individuals do seem to adjust work levels based on provisioning dependents through foraging, likely due to immediate returns and the compatibility between childcare and foraging within a dinner-time camp structure. These results suggest an answer to the question posed in the title of this book. People continue to forage because it is a viable economic alternative. Development efforts may be best directed at facilitating traditional foraging practices, which will in turn supply profound social and environmental benefits.

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Notes

1 Ironically, after the missionary's departure, Tonkinson (2007) came to see himself as a 'secular missionary' who began "shamelessly preaching to the initiated men against gambling and alcohol, and passionately urging them to maintain the integrity of their unique culture" for the love of what he came to know as Martu society. This period of time saw several such individuals, many of whom may have aided or at least encouraged the self-determination movements towards autonomy.

2 Many individuals like Martumilli Arts director Gabriel Sullivan helped to inspire and foster the current art movement in Martu communities. It was also certainly influenced by earlier movements in the desert (Myers 2002) and by visiting artists like Galiano Fardin, who was one of, if not the first artist to bring canvases, paint and encouragement out to Parnngurr.

3 Models examining all combinations of work choice between co-residing spouses result in z values ranging from -0.003 to 0.003 and p values from 0.9967 to 1.